

Name: Solutions

Directions: Show all work and each step in the process of simplifying or solving.

1. Simplify $\frac{y}{9} - \frac{y+27}{9} = \frac{y-y-27}{9} = \frac{-27}{9} = -3$

2. Simplify $\frac{k}{k+9} + \frac{9}{k+9} = \frac{k+9}{k+9} = 1$

3. Simplify: $\frac{t-45}{15} + \frac{t}{5} = \frac{t-45}{15} + \frac{3t}{15} = \frac{t-45+3t}{15} = \frac{4t-45}{15}$

4. Simplify: $\frac{w+1}{4} - \frac{w}{5} = \frac{5(w+1)}{5 \cdot 4} - \frac{4 \cdot w}{4 \cdot 5} = \frac{5w+5}{20} - \frac{4w}{20}$
 $= \frac{5w+5-4w}{20} = \frac{w+5}{20}$

5. Simplify: $\frac{a+1}{12} + \frac{a}{15} = \frac{5 \cdot (a+1)}{5 \cdot 12} + \frac{4 \cdot a}{4 \cdot 15} = \frac{5a+5}{60} + \frac{4a}{60}$
 $= \frac{9a+5}{60}$

6. Simplify $\frac{4}{m} + \frac{7}{n} = \frac{n \cdot 4}{n \cdot m} + \frac{m \cdot 7}{m \cdot n} = \frac{4n}{mn} + \frac{7m}{mn} = \frac{4n+7m}{mn}$

$$7. \text{ Simplify } \frac{1}{y^2} - \frac{2}{5y} = \frac{5 \cdot 1}{5 \cdot y^2} - \frac{y \cdot 2}{y \cdot 5y} = \frac{5}{5y^2} - \frac{2y}{5y^2} = \frac{5-2y}{5y^2}$$

$$8. \text{ Simplify: } \frac{x+3}{x} - \frac{x-2}{x^2} = \frac{x \cdot (x+3)}{x \cdot x} - \frac{x-2}{x^2} = \frac{x^2+3x}{x^2} - \frac{x-2}{x^2} \\ = \frac{x^2+3x-x+2}{x^2} = \frac{x^2+2x+2}{x^2}$$

$$9. \text{ Simplify } \frac{2}{3mn^2} + \frac{3}{4m^2n} = \frac{4m \cdot 2}{4m \cdot 3mn^2} + \frac{3n \cdot 3}{3n \cdot 4m^2n} = \frac{8m}{12m^2n^2} + \frac{9n}{12m^2n^2} \\ = \frac{8m+9n}{12m^2n^2}$$

$$10. \text{ Solve } \frac{8}{9} = \frac{3a}{4} = \cancel{4 \cdot 8} \cdot 4 \left(\frac{8}{9} \right) = 9 \cdot 4 \left(\frac{3a}{4} \right) \quad 4 \cdot 8 = 9 \cdot 3a \\ 32 = 27a \quad \frac{32}{27} = a \quad \left\{ \frac{32}{27} \right\}$$

$$11. \text{ Solve } \frac{1}{x+6} = \frac{3}{x+18} \quad (x+6)(x+18) \cdot \frac{1}{x+6} = (x+6)(x+18) \frac{3}{x+18} \\ (x+18) = 3(x+6) \quad x+18 = 3x+18 \quad x = 3x \quad 0 = 2x \\ 0 = x \quad \{0\}$$

$$12. \text{ Solve } 3x + \frac{x}{3} = 5 \quad 3 \cdot 3x + 3 \left(\frac{x}{3} \right) = 3 \cdot 5 \quad 9x + x = 15 \\ 10x = 15 \quad x = \frac{15}{10} \quad x = \frac{3}{2} \quad \left\{ \frac{3}{2} \right\}$$

$$13. \text{ Solve } \frac{2k}{3} + 1 = \frac{5k}{9} \quad 9 \left(\frac{2k}{3} \right) + 9(1) = 9 \left(\frac{5k}{9} \right) \quad 3(2k) + 9 = 5k \\ 6k + 9 = 5k \quad k + 9 = 0 \quad k = -9 \quad \{-9\}$$

14. Solve $\frac{4}{5y} + \frac{y-2}{y} = -\frac{1}{5}$

$$5y \left(\frac{4}{5y} \right) + 5y \left(\frac{y-2}{y} \right) = 5y \left(-\frac{1}{5} \right)$$

$$4 + 5(y-2) = y(-1) \quad 4 + 5y - 10 = -y \quad 5y - 6 = -y$$

$$6y - 6 = 0 \quad 6y = 6 \quad y = 1 \quad \{1\}$$

15. Solve $\frac{x-2}{4x-8} = \frac{1}{4}$

$$4(x-2) \left(\frac{x-2}{4(x-2)} \right) = 4(x-2) \left(\frac{1}{4} \right)$$

$$x-2 = x-2 \quad 0 = 0 \quad x = \text{All real \#s } x \neq 2$$

$$\{\mathbb{R}, x \neq 2\}$$

16. Solve $\frac{k}{k+1} + \frac{k+1}{k} = \frac{5}{2}$

$$2k(k+1) \left(\frac{k}{k+1} \right) + 2k(k+1) \left(\frac{k+1}{k} \right) = 2k(k+1) \left(\frac{5}{2} \right)$$

$$2k \cdot k + 2(k+1)(k+1) = 5k(k+1) \quad 2k^2 + 2k^2 + 4k + 2 = 5k^2 + 5k$$

$$4k^2 + 4k + 2 = 5k^2 + 5k \quad 0 = k^2 + k - 2 \quad 0 = (k+2)(k-1)$$

$$\{-2, 1\}$$

17. Solve. $\frac{x}{9} - \frac{x+5}{8} = -1$

$$x \cdot 8 \left(\frac{x}{9} \right) - 9 \cdot 8 \left(\frac{x+5}{8} \right) = 9 \cdot 8(-1) \quad 8x - 9(x+5) = -72$$

$$8x - 9x - 45 = -72 \quad -x - 45 = -72 \quad -x = -27 \quad x = 27$$

$$\{27\}$$

18. Solve. $\frac{5}{h^2} = \frac{6}{h} - 1$

$$h^2 \cdot \frac{5}{h^2} = h^2 \cdot \frac{6}{h} - h^2 \cdot 1$$

$$5 = 6h - h^2 \quad 0 = -h^2 + 6h - 5 \quad 0 = h^2 - 6h + 5 \quad 0 = (h-1)(h-5)$$

$$\{1, 5\}$$

19. Solve $\frac{1}{2p} + \frac{3}{10} = \frac{1}{5p}$

$$(10p) \left(\frac{1}{2p} \right) + (10p) \left(\frac{3}{10} \right) = \frac{1}{5p} (10p)$$

$$5 + 3p = 2 \quad 3p = -3 \quad p = -1 \quad \{-1\}$$